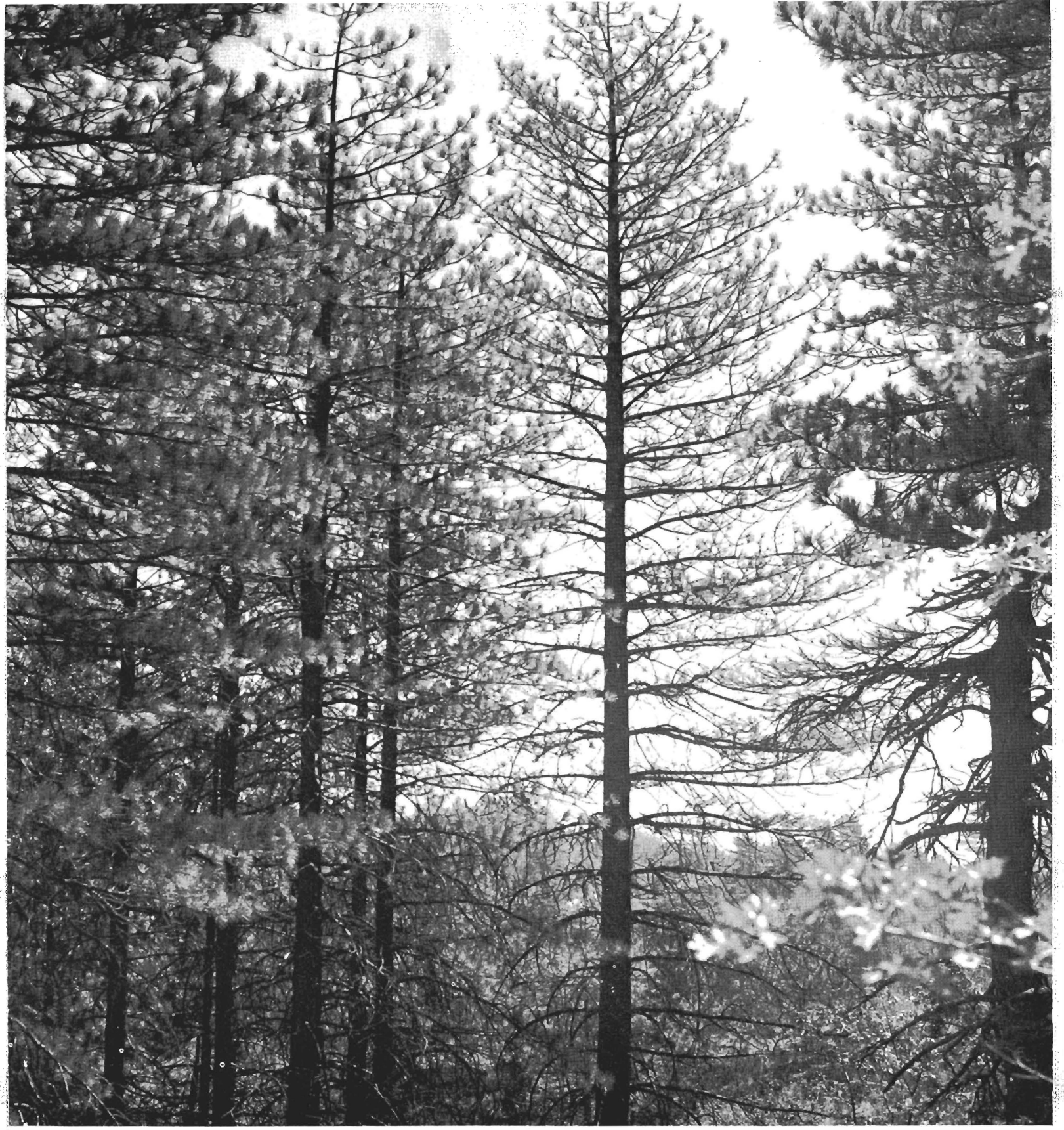


FOREST PEST CONDITIONS IN CALIFORNIA-1969

A PUBLICATION OF
THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL

THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL was formed in 1951 in recognition of the need for close cooperation among land managers concerned with forest pest problems. Primarily an advisory and coordinating group, the Council sponsors a Statewide cooperative forest pest detection survey; publishes an annual report of forest pest conditions; studies, endorses, and supports desirable pest control actions, reviews control needs and programs; and provides a forum for the exchange of pest control information. The California State Board of Forestry has designated the Council as its official advisory group for forest insect, disease and animal problems. The Council comprises the following organizations:

Boyce Thompson Institute
California Forest Protective Association
California Redwood Association
State of California: Departments of Agriculture, Conservation, Fish and Game, Parks and Recreation, and the University of California
U. S. Department of Agriculture, Forest Service
U. S. Department of the Interior, Bureaus of Indian Affairs, Land Management, Sport Fisheries and Wildlife, and the National Park Service
Western Wood Products Association

THIS REPORT, FOREST PEST CONDITIONS IN CALIFORNIA - 1969, is compiled for public and private forest land managers to keep them informed of pest conditions on forested lands in California, and as a historical record of pest trends and occurrences. The report is based largely on information provided by the California Cooperative Forest Pest Detection Survey. In 1969, 583 reports were received; 185 for insects, 378 for diseases, and 20 for animal pest damage.

The report was prepared by the Forest Service and the Bureau of Sport Fisheries and Wildlife in cooperation with other member organizations of the Council. It was duplicated and distributed by the California Division of Forestry.

THE COVER PHOTO: Smog damage is a critical disease of ponderosa and Jeffrey pine in mountains forming the eastern boundary of the Los Angeles basin, see page 2. In these high-use forests, many trees have died and many others display the typical symptoms evident on the center tree of the cover photo: fewer needle whorls on each branch, shorter needles, mottled, sick-looking needles.

Sacramento January 1970

HIGHLIGHTS OF PEST CONDITIONS - 1969

STATUS OF INSECT PESTS. Insect pests killed fewer trees in California forests in 1969 than in any recent year. Bark beetle outbreaks, which traditionally account for most insect-caused tree mortality, were fewer in number and confined to more limited areas. However, there were increases in localized insect outbreaks apparently associated with human activities. These include outbreaks of several bark beetles in an area sprayed with sewage effluent at Lake Tahoe, a scale epidemic associated with mosquito control spraying at Lake Tahoe, and increased bark beetle activity in smog-damaged forests of southern California. Other problems include a serious uptrend in populations of the lodgepole needle miner in Yosemite National Park and grasshopper damage to newly established plantations at two locations in Siskiyou County.

STATUS OF DISEASE PESTS. With the exception of foliage diseases, forest disease conditions changed but slightly during 1969. Additional scouting and surveys revealed a number of new infection centers of white pine blister rust including one center in Garfield Grove, Sequoia National Park. However, the scouting did not extend the location of white pine blister rust south of infection centers known in 1968. The heavy precipitation during the winter of 1968-69 created conditions highly favorable for needle and foliage diseases. A twig disease found, for the first time in America, caused some damage in Christmas tree farms near Quincy, Plumas County. Five needle diseases and one twig disease were reported that were either new to California or new to their host or new to both. Air pollution in the Angeles and San Bernardino Forests continued to cause tree decline and mortality.

STATUS OF ANIMAL PESTS. Deer depredation was most serious in the Douglas-fir areas of the four northwestern counties. Porcupine damage was widespread, but most serious in Siskiyou and Lassen Counties. Pocket gopher damage in Siskiyou and Modoc Counties was local, but serious.

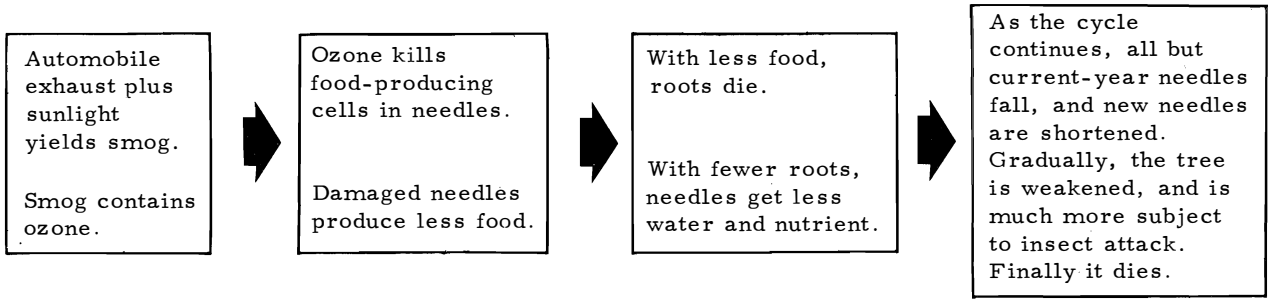
SMOG DAMAGE TO FOREST TREES
a special report

Unhealthy ponderosa pines in the Arrowhead-Crestline area, San Bernardino County, were first reported in the late 1940's, and were first studied on the ground in 1950. Over the years, this condition has been referred to as X-Disease, Chlorotic Decline, and Ozone Needle Mottle.

Since 1950, many foresters, pathologists, and entomologists have worked on the problem, but until recently, the cause of damage remained unidentified. Meanwhile, the situation grew progressively worse, alarming land managers, residents, and visitors to this intensively-used forest east of Los Angeles.

WHAT IS SMOG ? Most smog (70%) begins as automobile exhaust. When exhaust-polluted air is acted upon by sunlight, several toxic chemicals are produced, including ozone. Ozone is especially harmful to green plants. Even forest trees remote from urban areas are affected.

HOW DOES SMOG KILL TREES Ozone in the air kills food-producing cells in the needles of forest trees. Weakened trees are more vulnerable to further smog damage, and a cycle of decline begins. The process is slow, but progressive, and as long as the smog remains, it is irreversible.


Automobile exhaust plus sunlight yields smog.
Smog contains ozone.
Ozone kills food-producing cells in needles.
Damaged needles produce less food.
With less food, roots die.
With fewer roots, needles get less water and nutrient.
As the cycle continues, all but current-year needles fall, and new needles are shortened. Gradually, the tree is weakened, and is much more subject to insect attack. Finally it dies.

WHAT CAN BE DONE ? The best answer is the most direct: eliminate smog. By 1969 the problem in southern California was so acute that citizen groups throughout the State were pressing for prompt legislative action, and the California Forest Pest Action Council by formal resolution urged the State Legislature to make the control of air pollution a first priority matter in 1970.

Many possible causes, including scale insects, infectious needle and root diseases, soil moisture and nutrient deficiences were studied during the late 1950's, but the condition could be traced to none of them.

A 1957 report by the San Bernardino National Forest, suggested that smog was the culprit, and subsequent investigation by the Forest Service and University of California supported this suggestion.

In 1962, researchers reported that the ozone component of smog will cause needle damage that is typical of that found on afflicted trees; other investigations further implicated ozone as the primary cause of the disease.

Other studies carried out by the Forest Service and the University of California in the Arrowhead-Crestline area found that smog-damaged ponderosa pines are especially prone to attack by bark beetles, and that the more severely-affected trees were the most vulnerable.

Present smog-damage research is being carried out by the Forest Service in cooperation with the University of California Statewide Air Pollution Center at Riverside. It is funded by the National Air Pollution Control Administration of the U.S. Department of Health, Education and Welfare, Public Health Service. Earlier work was financed in part by the California Division of Forestry.

Originally, smog damage was thought to be present on about 25,000 acres; however, an aerial survey in 1969 revealed that the disease is much more widespread in ponderosa and Jeffrey pine stands in Los Angeles, San Bernardino and Riverside Counties.

- The survey covered 161,000 acres, which is nearly all of the ponderosa and Jeffrey pine type on the San Bernardino Forest. Pines on all areas surveyed were affected to some extent; on 29 percent of the area, damage was severe; on 33 percent, damage was moderate; on 38 percent, damage was light.

- Survey results indicate that 1.3 million trees are affected to some extent: 3 percent are dead, 15 percent are severely affected, 82 percent are lightly or moderately affected. Not included are the many trees that already have been killed and removed from the forest.

Although early reports dealt entirely with ponderosa pine, recent investigations stress that although ponderosa pine is the most severely affected, ozone injury has been observed on white fir, incense-cedar, Coulter pine, bigcone Douglas-fir, and Jeffrey pine -- and that Jeffrey pine is nearly as sensitive as ponderosa pine. Sugar pine and giant sequoia are the most tolerant species yet tested. For the present, reforestation of severely-affected areas on the San Bernardino National Forest will employ the less sensitive species.

Also, local foresters have long recognized that some individual ponderosa and Jeffrey pines are more resistant than others of the same species, possibly providing another alternative if smog continues to be a problem in this area.

Elsewhere in California, preliminary surveys reveal incipient smog problems in Monterey and ponderosa pine stands near Santa Cruz, and in mixed-conifer stands in the Sierra Nevada east of Fresno.

STATUS AND CONTROL OF INSECT PESTS

WESTERN PINE BEETLE, Dendroctonus brevicomis. The epidemic of western pine beetle in young-growth ponderosa pine at McCloud Flats, Siskiyou County declined in 1969. Direct control measures were applied by logging infested trees in the fall of 1968 and spring of 1969. This project, which removed about 7,200 infested trees or 2.5 million board feet of infested material, caused a marked reduction in the intensity of the infestation as well as some reduction in the area. Commercial thinning sales have been programmed to relieve the over-dense pine stocking. This silvicultural treatment is prescribed to protect against future outbreaks in the area.

Chronic western pine beetle infestations continued at Basket Pass and Bradshaw Creek in Kern County; Plaskett Ridge in Monterey County, and a new outbreak developed in a local area near Bass Lake in Madera County. Direct control is planned for these areas except Basket Pass. Scattered outbreaks detected in the Cosumnes River area, between Camino and Omo Ranch, and in the Yuba River drainage, from the South Fork to Brownsville, subsided during the year while late summer flare-ups developed at Cedar Ridge and Thirteen Mile Creek in Tuolumne County. Evaluations indicate control for the last two areas is not needed at this time.

In southern California, western pine beetle activity increased slightly around Lake Arrowhead and Barton Flats in San Bernardino County; but remained static in the Pine Hills Burn and declined at Julian in San Diego County. The increase in tree killing in San Bernardino County is apparently associated with the increasing air pollution damage to ponderosa pine in the Lake Arrowhead-Barton Flats area.

FIR ENGRAVER BEETLE, Scolytus ventralis. Scattered infestations of fir engraver beetles in northern California subsided during 1969. While this beetle killed seventy trees in Camp Richardson at Lake Tahoe, severe root damage from Fomes annosus predisposed the trees to beetle attack. In commercial forest areas such as Eight Mile Ridge, Trinity County; and Buck Mountain, Humboldt County, late fall ground checks showed nearly complete collapse of the infestations.

OTHER BARK BEETLES AND TWIG INSECTS. In a sewer effluent disposal area, near South Lake Tahoe, there was reported tree killing of white fir, lodgepole pine and Jeffrey pine by the fir engraver beetle; the mountain pine beetle, Dendroctonus ponderosae, and the California flatheaded borer, Melanophila californica on locations sprayed with sewer effluent in 1966 to 1968. Some increase in California flatheaded borer activity in Laguna Mountains of San Diego County and at Wrightwood, San Bernardino County, was reported. However, damage from bark beetles in most areas of the State declined to a low level.

In numerous locations in northern California, oak twigs have been damaged and killed by heavy infestations of a Cynipid wasp, probably Callirhytis perdens.

SAPSUCKING INSECTS. The epidemic of pine needle scale, Phenacaspis pinifoliae continued in the community of South Lake Tahoe, El Dorado County. The strategy for dealing with this problem will be to conserve and increase natural enemies of the scale. This is to be accomplished by changing the present mosquito control program from a fogging treatment with malathion, which is detrimental to the natural enemies of the scale, to a source-abatement program employing larvacides and the introduction of mosquito eating fish.

In southern California, the pinyon pine scale, Matsucoccus acalyptus, is epidemic over some 22,000 acres of the arid pinyon pine type in Ventura and Kern Counties. Some tree killing has taken place. Operational spraying of individual recreation sites, to prevent tree killing, is under consideration for 1970.

In northern California, an outbreak of a leaf scale, also identified as Matsucoccus acalyptus, has persisted into the fourth year and is severely weakening sugar pines near Callahan in Siskiyou County.

Heavy populations of the black pine leaf scale, Nuculaspis pini, on sugar pine were found near Long Barn, Tuolumne County, and on ponderosa and Jeffrey pine near Burney, Shasta County. In addition to these damaging infestations widespread endemic scale populations exist in numerous localities.

DEFOLIATING INSECTS. Most of the noticeable defoliation in the forest occurred on hardwood trees and shrubs in 1969. The California oakworm, Phryganidia californica, defoliated thousands of oaks in highway scenic areas from King City, Kings County, to Salinas, Monterey County. Improved preparations of Bacillus thuringrensis, a microbial insecticide, were tested by University of California entomologists and proved to be a very effective spray for controlling this insect. The unsightly webs of the fall webworm, Hypantria cunea, on madrone and occasionally alder trees were reported from Yuba, Shasta and Monterey Counties. The brown day moth, Pseudohazis eglonterina, defoliated bitterbrush on about 1,000 acres near Indiana Summit, Mono County. The elm leaf beetle, Pyrrhalta luteola, and the alder flea beetle, Altica ambiens, also damaged elm and alder in various locations.

None of the conifer defoliators caused serious damage in 1969. However, detailed field sampling of the lodgepole needle miner, Coleotechnites milleri, in Yosemite National Park showed significant increases in numbers of larvae this year. If unchecked, this resurgent population is expected to cause serious defoliations in 1971.

Sugar pine damaged by scale insects along the Callahan-Cecilville road, Siskiyou County. The infestation has persisted through four years and sugar pine showing varying degrees of damage now occur over several thousand acres. The thin foliage of the tree on the right is typical of a severely damaged tree.

In southern California, the persistent infestation of Coleotechnites sp. in Jeffrey pine at Snow Valley, San Bernardino County , showed some decrease in population.

The Douglas-fir tussock moth, Hemerocampa pseudotsugata, was detected in small numbers again at Wilcox Springs and Latour State Forest, Shasta County, and a few larvae were detected for the first time at Redwood Mountain, Fresno. Spot infestations of the white fir sawfly Neodiprion abietis, were reported from Swain Mountain and Diamond Mountain, Plumas County, and were the first indications of renewed activity of this defoliator since 1966. A pandora moth, Coloradia lindsayi, caused light defoliation of Jeffrey pine at Rattlesnake Meadows, Kern County.

INSECTS DAMAGING PLANTATIONS AND YOUNG TREES. For the second year, grasshoppers severely damaged newly planted plantations near Mt. Shasta City, and for the first time invaded plantations near Doe Peak, Siskiyou County. The infestation in both areas was successfully controlled with the cooperation of the Agricultural Research Service. The principal damaging grasshopper was the wingless species, Bradynotes obesa. This species also required control in 1968.

The Douglas-fir bud mite, Trisetacus pseudotsugae, was discovered for the first time in California in nursery stock near Half Moon Bay, San Mateo County by the County Agricultural Inspector. Follow-up detection surveys also located the mite in natural Douglas-fir stands and concluded it is a native organism, probably confined to coastal areas. Eradication or control action is not planned.

Valuable grafted seed orchard stock in the Placerville seed orchard, El Dorado County has suffered frequent attacks by a variety of insects. The pine needle-sheath miner, Zelleria haimbachi; a shoot moth, Eucosma sp., and the pitch midge, Cecidomyia pininopis were active this year and were suppressed with dimethoate sprays. Also at the adjoining Forest Service nursery, the cutworm, Agrotis ipsilon, damaged seedlings in several seedbeds. They were suppressed with an application of Sevin dust.

Light, but widespread, infestations of Douglas-fir gall midges, Contarinia spp. were discovered in the Counties of Mendocino, Humboldt, and Del Norte.

Logging insect-infested trees in the McCloud Flats western pine beetle outbreak in young-growth ponderosa pine.

STATUS AND CONTROL OF DISEASES

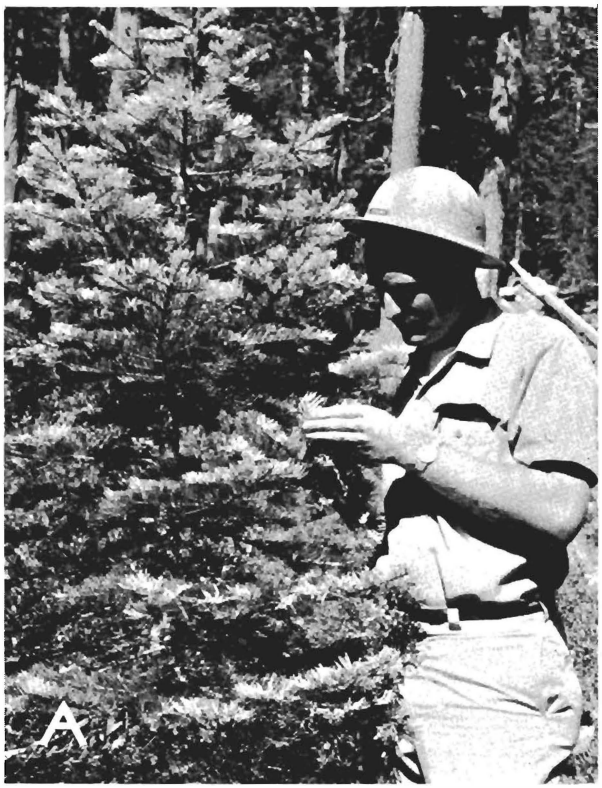
Other than foliage diseases, there was little change in the overall forest disease situation within California during the past year. The heavy precipitation that occurred during the winter of 1968-1969 helped tree growth but created conditions highly favorable for needle and foliage diseases within limited areas.

DISEASES SHOWING CYCLIC INTENSIFICATION. A needle rust on white fir caused by the fungus Pucciniastrum goeppertianum was the heaviest observed since the present detection system has been in operation. The disease prevented sales of Christmas trees from two areas in Placer County with an estimated area of over 100 acres. The rust was also fairly common at small areas in El Dorado County. The alternate host, huckleberry, produces spores which infect current-year white fir needles soon after they break bud. By mid-July, the diseased needles turn yellow making the tree unsuitable for Christmas trees.

Two needle casts were quite severe within comparatively small infection centers. One, Lophodermella arcuata, infected sugar pine of all ages within an area of 50 acres at Hunters Valley, El Dorado County. Infected trees lost from 50 to 90 percent of their second-year needles. The disease occurred locally from Siskiyou County to Tuolumne County. A second needle cast, Davisomycella montana severely infected lodgepole pine causing severe needle drop in two-year-old needles in the Horse Meadow, Big Meadow and Taylor Meadow areas, northeast of Kernville in Kern County. Light infection occurred as far north as Modoc County.

The two brown felt blights (sometimes known as snow molds) caused by the fungi Neopeckia coulteri on the pines and Herpotrichia nigra on other conifers, were quite common throughout the State in areas of heavy snowfall. In a few stands of lodgepole pine, trees up to about eight feet in height were killed in large numbers. The foliage and twigs of larger trees also were killed up to about the same height (eight feet above the ground). Young trees of the giant sequoia, mountain hemlock, red fir and white fir also were damaged by H. nigra.

A twig disease on white fir caused by the fungus Sydowia gregaria, found southeast of Quincy and near Portola in Plumas County, damaged trees in at least two Christmas tree areas and rendered some of them unfit for sale. This is the first time this fungus has been found in the United States. It was first located, described, and named in East Germany in 1895. The damage was first reported in the Quincy area in 1966, but mature spores enabling identification were not found until July of 1969. Also, the disease has been reported on other young stands of white fir at Keddie, Yuba Pass and Sierra City, all in Plumas County. Since specimens were not submitted from the latter locations, the presence of the disease cannot be verified.



White fir needle rust (Pucciniastrum goeppertianum) in Placer County.

A. Several hundred white fir trees rendered unsalable by the rust in this Christmas tree area.

B. Aecial stage of the pathogen on the current-year needles. Huckleberry is the alternate host.

The cytospora canker of red and white fir, caused by the fungus Cytospora abietis, was extremely severe in some areas. The fungus attacks trees or limbs that have been weakened previously by other causes. Dwarf mistletoe infections often weaken the twigs, limbs, or even trees on which they grow and the death of many of these is hastened by C. abietis. As much as one-third of the crown of mature trees in a few stands of red fir was killed in Siskiyou County.

ROOT DISEASES. Numerous new centers of the three major root diseases were found in 1969.

Fomes annosus. As of November 30, 1969, F. annosus had been reported from 68 new areas throughout the State. Many areas had more than one infection center (points of incidence or foci) present and one had 20 such centers. A total of 158 centers occurred at the 68 locations. A breakdown of the infection areas shows five were in thinning areas, 12 in campgrounds, one in a plantation, 16 along road rights-of-way, 31 in timber sale areas, and three on roots of trees blown over in areas where no stumps were present. Of the 158 centers in the 68 locations, the fungus had gained entrance by way of freshly-cut stumps in all but three centers. Some centers in the Laguna Mountain area were over 100 acres in size.

Armillaria mellea. Armillaria root disease now has been found in practically all of the broadleaf and coniferous trees of California. It is present in most stands and awaits a loss in a tree's vigor to permit a successful infection. Past root disease surveys show that nearly one-half of the trees in white fir stands have lost from a few small roots to most of the root system to this fungus. Root disease surveys also showed it to be the principal root destroyer of windthrown giant sequoia trees. Thirty-two new locations of the disease were reported in 1969.

Verticicladiella wagenerii. The black-staining root disease infection centers reported varied in size from a single killed Douglas-fir on the Hoopa Valley Indian Reservation in Humboldt County, to an area of about 7,800 acres of pinyon pine in San Bernardino County that contains a number of large infection centers. Another center affecting ponderosa pine was found on the Georgetown Divide in El Dorado County.

NEEDLE DISEASES. Because of above-normal rainfall during the winter and spring, needle disease activity generally showed increased spread and intensification in 1969. Two new centers of red band needle blight, caused by the fungus Scirrhia pini (Dothistroma pini) were found in Humboldt County. One center was on native shore pine (Pinus contorta) in Patricks Point State Park, and the other was on Monterey pine in a plantation southeast of Big Lagoon. Although S. pini had been found previously on planted shore pine, its discovery at Patricks Point places it in a naturally regenerated stand of this species for the first time in

Trees of pinyon pine killed by the black staining root fungus (Verticicladiella wagenerii) - San Bernardino County. Numerous infection centers, involving from one to several hundred trees, occur in this area.

California. As a control measure, diseased Monterey pine trees at the Naval Housing Unit at Ferndale were sprayed with Bordeaux misture at regular intervals during the summer. They now support little infection. At Jackson State Forest, Mendocino County, the upper foliage (30-40 feet above the ground) appears to be above the level favorable for severe infection. As a result, the trees seem to be holding their own. At all other infected plantations the red band needle blight is killing the trees at a rapid rate. At most plantations, where the disease has been present for 3-5 years, from 60 to 80 percent of the trees are now dead. Also, the disease was found on a Jeffrey pine growing under infected Monterey pine at Jackson State Forest.

Needle diseases reported for the first time in California, for the first time on the host or a first time for both were:

1. Mycosphaerella pinsapo on needles of red fir. (A first for host and location.)

2. Rhizosphaera pini on needles of red fir. (A first for host and location.)

3. Rhizosphaera kalkhoffi on needles of Colorado blue spruce. (A first for location.)

4. Lirula nervisequia var. conspicua on needles of bristlecone fir. (A first for host and location.)

5. Rhabdocline pseudotsugae S. sp. ephipylla on needles of Douglas-fir. (A first for location.)

Other needle diseases reported or identified during 1969 were:

Elytroderma deformans was reported on Jeffrey and ponderosa pine from many areas and appeared to be more prevalent than usual. One unexplained peculiarity of this needle cast this year was its lack of spore production. Only an occasional fruiting structure was produced even on trees that were heavily infected.

Needle diseases found on pines but of little or no significance were: Amerosporium sp. on Monterey pine; Coryneum cinerum on ponderosa pine; Davisomycella medusa on Jeffrey and ponderosa pine; D. montana on lodgepole pine; Lophodermium pinastri on Monterey, ponderosa, Jeffrey, lodgepole and Coulter pine; Naemacycleus niveus on Monterey, Coulter and ponderosa pine; Lophodermium arcuata on sugar pine; and Neopeckia coulteri on lodgepole, white bark and western white pine.

Needle diseases found on true firs were: Furcaspora pinicola on white fir; Herpotrichia nigra on red fir and in addition on giant sequoia and incense-cedar; Lirula abietis-concoloris on red fir; L. nervisequia var. conspicua on bristlecone fir; Metasphaeria acuum on red fir; Phacidium infestans var. abietis on white fir; Stegopezizella balsameae on white fir; Virgella robusta on white fir; a species of Stagnospora on red fir, and Tryblidiopsis pinastri on white fir.

Rhabdocline pseudotsugae was found on Douglas-fir and Sphaerulina taxi on Pacific yew.

DWARF MISTLETOE. Dwarf mistletoe was reported on Coulter, Digger, pinyon, Jeffrey, western white pine, sugar pine, white fir, red fir and Brewer spruce. Many mature stands of infected red fir are breaking up from dwarf mistletoe, cytospora canker, and other causes. One stand of mountain hemlock west of Mokelumne Peak in Amador County is severely damaged.

Most control work on National Forests continued to be done by means of timber sales and stand improvement projects. Reexamination of early control projects on Kings Canyon National Park and on several National Forest recreation sites indicated that dwarf mistletoe can be controlled successfully in such areas.

WHITE PINE BLISTER RUST. Blister rust conditions remained unchanged, and the cooperative control program continued with the California Division of Forestry, the National Park Service, and the Forest Service all playing important roles. BRC accomplishments are reported more fully in the annual report Forest Disease Control in California, issued annually by the Forest Service.

Scouting. Scouting in Zone 3 (see map, page14), confirmed the results of 1968 work there -- that blister rust occurs as local, widely-separated infection centers; this is in sharp contrast to the situation in Zone 2 where infected sugar pines are found in all major streams. Scouting at several high elevation locations in Zone 3 again produced negative results. No further scouting is planned for Zone 2, but a continuing scouting program will be carried out in Zone 3. Most of the scouting will be contracted.

Incidence Survey. California Division of Forestry crews, working mainly on private land in the Lassen area, and seasonal crews on the Plumas National Forest collected data on the amount and distribution of infected pines in a series of sample areas surrounding the 45 oldest, stream-oriented infection centers in these areas. Contracts were awarded to several consulting foresters for similar work on the Lassen, Tahoe, and Eldorado National Forests. In all, about 100 sample areas, representing most of the oldest infection centers in the northern Sierra Nevada will have been surveyed by fall, 1970.

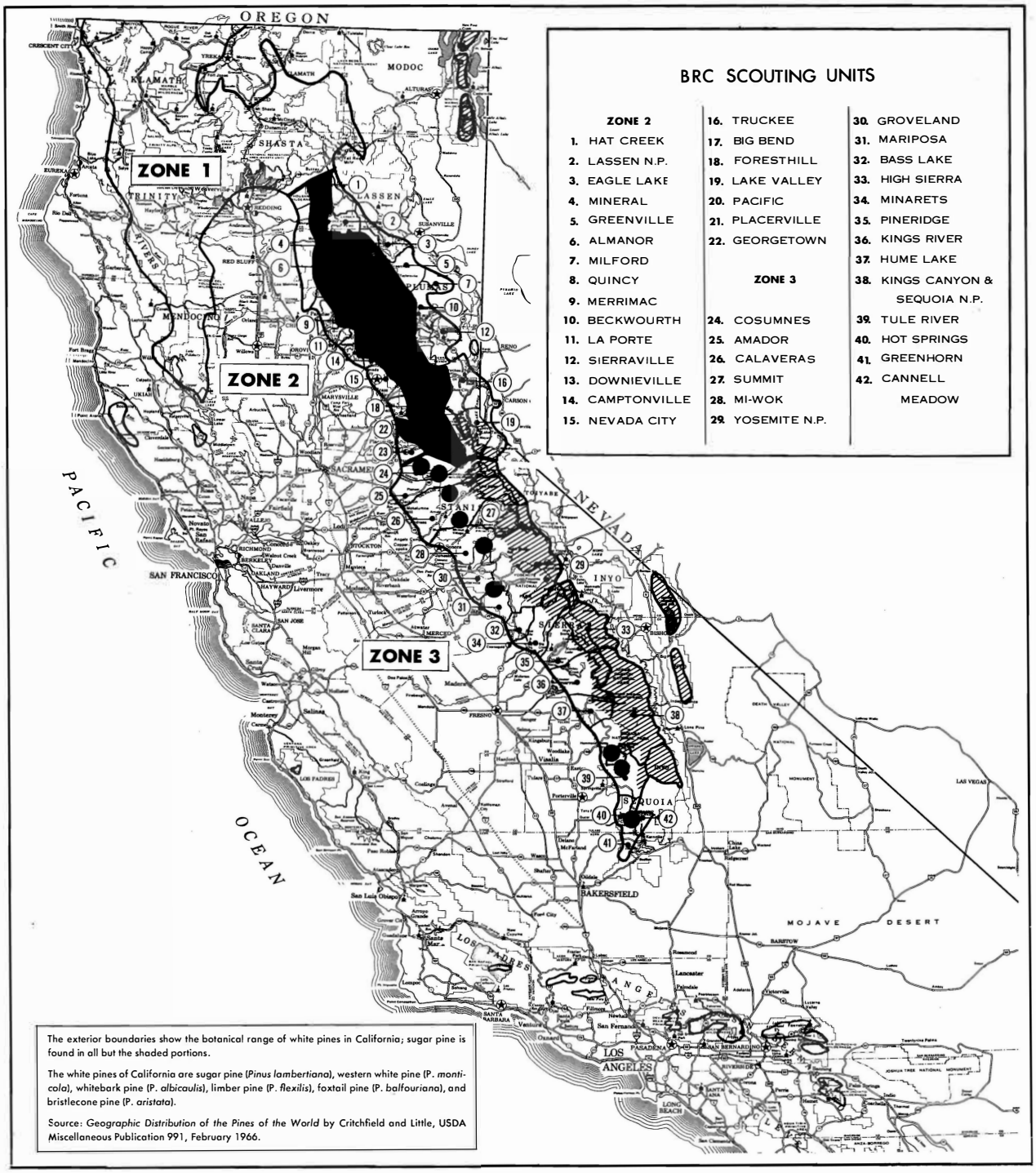
Direct Control. Direct control -- that is, a continuing program of detection (scouting) and intensive search and sanitation where infected pines are found -- was adopted as the control method in Zone 3, and in Lassen Park. The following search and sanitation projects were carried out in 1969.

- - Lassen Volcanic National Park. Sanitation rework near the south boundary of the Park.

- - Stanislaus National Forest. One small search and sanitation contract on the Calaveras District, and continuation of sanitation projects elsewhere.

- - Sequoia National Park. One small sanitation contract in the Garfield Grove near the south boundary of the Park.

- - Sequoia National Forest. One search and sanitation contract on National Forest and private land, mainly in the Dillonwood area immediately south of Garfield Grove.



White Pine Blister Rust in California. Surveys in the Sierra Nevada indicate that conditions in the south differ greatly from those in the north. In Zone 1, infected trees have been present for many years, but a recent evaluation of the disease in this area has not yet been made. In Zone 2, blister rust is present in most streamside sites throughout the main sugar pine belt. In Zone 3, the disease is confined to a few local and widely separated infection centers.

- - Mountain Home State Forest. A 12,000-acre search and sanitation project by a two-man California Division of Forestry crew, during which the main streams in and surrounding Mountain Home Home State Forest were searched and several hundred infected trees were cut from about 50 separate infection centers.

  The largest sanitation project in the State in the main infection center at Mountain Home State Forest was continued. Inmate crews cut and pruned infected trees within a 1,000-acre infection center.

Ribes Eradication. Except for plantations containing sugar pine, all ribes eradication in Zone 2 was deferred pending completion of the BRC Program Review which is reported on below. Ribes eradication was done on the Shasta and Klamath Forests.

BRC Program Review. A comprehensive review of the blister rust control program in California has been underway since 1967. A progress report was issued in May 1969, and an inventory of blister rust infection centers in Zone 3 was issued in June 1969. A second progress report and a revision of the inventory will be issued early in 1970.

OTHER RUSTS. A listing of other rusts reported during the year were: C. comandrae on both ponderosa pine and bastard toad flax at the Long Valley ponderosa pine plantation just west of Burney Falls in Shasta County; C. occidentale on pinyon pine and ribes; Gymnosporangium libocedri on incense-cedar and western service berry; Melampsora epitea on willow in Fresno County; Peridermium filamentosum on Jeffrey pine; P. harknessii on bishop, Monterey, Digger, Coulter, Jeffrey, ponderosa, knobcone and lodgepole pine; P. stalactiforme on Jeffrey and lodgepole pine; Phragmidium rosae-californicae and P. disciflorum on wild rose; Puccinia caricina on wild gooseberry; P. evadens on coyote brush; P. absinthii on sagebrush; Pucciniastrum goeppertianum on white fir and huckleberry, and Melampsorella caryophyllacearum on white fir, red fir and chickweed.

TWIG DISEASES. Several twig diseases, other than the rusts, found on both coniferous and broadleaf trees were: Atropellis pinicola on sugar pine; Cenangium ferruginosum on white fir and Jeffrey pine, Corticum corruge on red fir; Cytospora abietis on white and red fir; Dasyscypha arida on red and white fir; D. ciliata on Douglas-fir; Hysterographium formosum on whitebark pine; Phomopsis lokoyae on Douglas-fir; Scleroderris abieticola on red fir; Tryblidiella macrospora on incense-cedar and Sydowia gregaria on white fir.

Another twig disease, Dendrophoma pleurospora on whitebark pine, was found for the first time in California near Minaret Overlook in the extreme eastern edge of Madera County. No record of the disease could be found on whitebark, therefore, it may be a first time report for this host.

Two diseases were found on broadleaf trees. These are: Botryosphaeria ribis on twigs and limbs of madrone and Cytospora chrysosperma on twigs, limbs and trees of trembling aspen and various species of willow.

HEART ROTS. Again, numerous wood rotting fungi were reported. The most common of these were: Fomes pini on Douglas-fir, ponderosa, lodgepole and knobcone pine; Echinodontium tinctorium on red and white fir; Fomes officinalis on Douglas-fir; F. pinicola on white fir, ponderosa pine and Douglas-fir; Lentinus lepideus on Jeffrey pine, Pholiota adiposa on red and white fir; Polyporus amarus on incense-cedar; P. leucospongia on Jeffrey and lodgepole pine and on red fir; P. sulphureus on red fir and Douglas fir; P. oregonensis on white fir; P. valvatus on ponderosa pine, and Trichosporium symbioticum on white fir. The latter fungus is associated with unsuccessful attacks of the fir engraver beetle, Scolytus ventralis. This beetle carries the fungus that either kills or affects the cambium in the immediate vicinity of the attack. If killing does not result, the cambium is darkened for a varying distance from the boring area but no wound results. If killing occurs, a wound is caused that may take up to 10 years to heal. The fungus causes a brown stain in the sapwood and inner bark, kills the cambium and reduces the moisture content of the cambial region ahead of the beetle larvae. This fungus is also found in red fir.

PHYSIOLOGICAL DISORDERS. Numerous reports of damage, from causes other than pathogens, were common. Again, winter damage was widespread throughout the State. Some trees lost considerable foliage and twigs while others sustained little damage. Hail damage was reported from several areas, and caused severe damage to trees locally. Reports of hail were submitted from western Siskiyou, Lassen and Fresno Counties. Damage from chemicals was reported along roads, power lines, and in Christmas tree plantations. Young trees, in plantations sprayed for brush control, were damaged in some cases. Blue-broom, a witches'-broom of unknown cause on sugar pine, was found and reported from several areas.

NURSERY DISEASES. Fumigation of seedbeds, in forest nurseries before seeding, again held seedling losses to a low level in 1969; however, there was a small amount of damage at several nurseries. Botrytis cinera caused some loss to Douglas-fir at the Forest Service Humboldt Nursery. Some loss of white fir seedlings at the California Division of Forestry Magalia Nursery was due to a combination of three pathogens, Fusarium oxysporum, Rhizoctonia solani and one or more species of

Pythium. A private nursery at St. Helena suffered considerable loss from a combination of Macrophomina phaseoli and Pythium sp. At the Forest Service Placerville Nursery there was a marked stunting of small patches of incense-cedar and giant sequoia seedlings. The reason for the reduced growth in these two tree species has not been determined.

MISCELLANEOUS DISEASES. Over 25 reports of true mistletoe on white fir, Phoradendron bolleanum var. pauciflorum; on incense-cedar P. juniperinum var. librocedri; on western juniper P. juniperinum, and on Baker cypress P. bolleanum var. densum were received.

Heavy losses have been occurring in bitterbrush over the last few years from northern Lassen County and eastern Shasta County northward into southern Oregon. It is estimated that over 30,000 acres are involved. The first symptoms of the brush decline is the formation of swellings by twig dying and later limb or branch dying. Eventually the entire plant may die. No fungus fruiting structures have been found on these cankers but numerous fungi have been cultured from them. Most of these have been identified as harmless saprophytes, but six possible pathogens remain in culture and await the producing of some type of spore for identification. All bitterbrush bushes that showed decline supported from one to numerous cankers.

Tree of pinyon pine infected with the black staining root fungus. The disease shows as concentric black bands in the cross section of the root and as black vertical streaks in the tangential cut of the lower bole. Once the staining has advanced this far the tree is doomed.

STATUS AND CONTROL OF ANIMAL PESTS

DEER. Browsing of seedlings and saplings of most coniferous species was widespread in the State. Serious damage was inflicted on Douglas-fir in Humboldt, Del Norte, Siskiyou and Mendocino Counties. Several hundred acres of ponderosa pine plantation was damaged at Hat Creek, Shasta County on the migration route of the Lassen deer herd. Deer browsing is consistently high in the north coastal areas, but generally fluctuates on the inland forests. Special deer hunts are being considered for damage reduction. The Olympia Research Station of the Bureau of Sport Fisheries and Wildlife established a series of deer repellent test plots on the Sierra National Forest near Oakhurst in a continuing effort to find better and more desirable control methods.

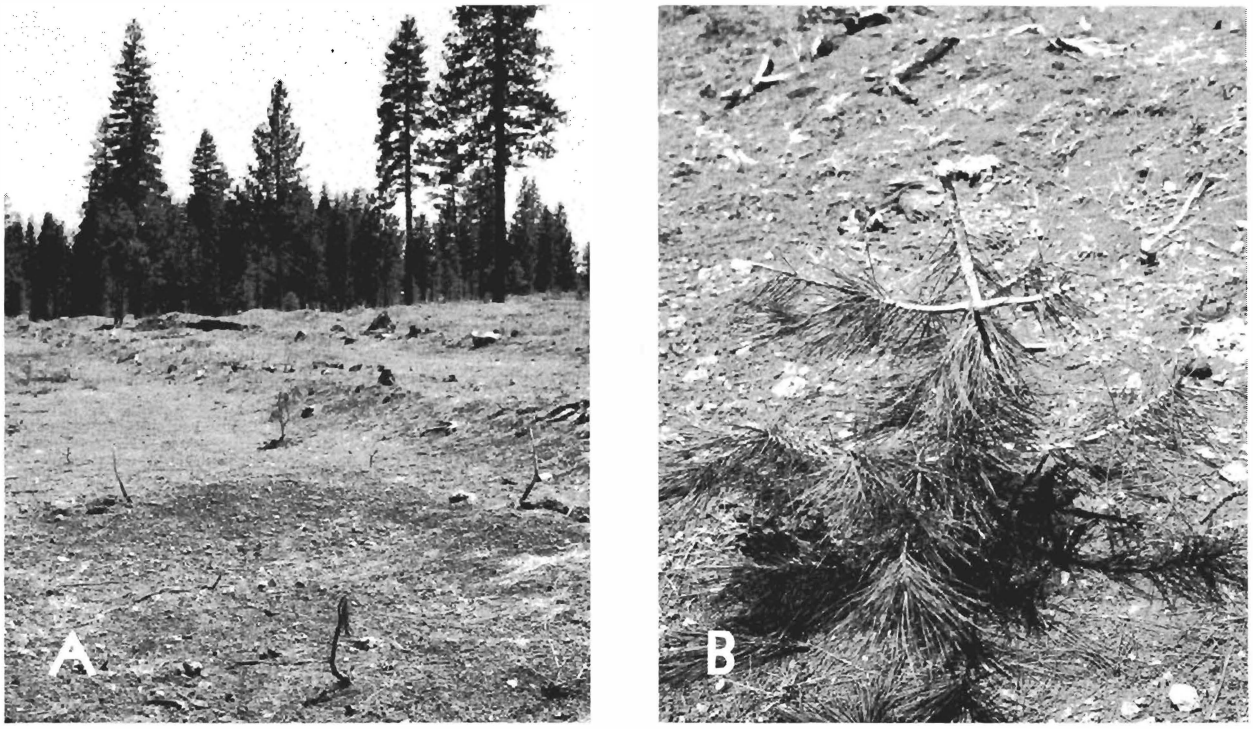
PORCUPINE. Damage was general across the inland northern counties and southward in the Sierra Nevada range to Inyo County. The most serious damage was in the Sucker Creek and Wildhorse Mountain areas of Siskiyou County and in the Rice Canyon area north of Susanville in Lassen County. Increasing damage of concern is reported in Mendocino County and to the Ice House Plantation in El Dorado County. Control was conducted in a number of areas using standard porcupine salt blocks placed in rest trees, natural dens and man-made cubbies. The Olympia Research Station initiated field tests of a new attractant block in California and they will be continued through the coming year.

POCKET GOPHER. Plantation damage was reported in all timber growing areas of the State from the northern to southern counties, except the north coastal areas. The most serious damage occurred in the Deer Mountain area of Siskiyou County and on the Lava Plantation of Siskiyou and Modoc Counties. Control is being undertaken using the new "forest-land" burrow builder. Several hundred acres of damaged plantation was treated during the spring of 1969. Some of the results look promising but cannot be fully evaluated until the spring of 1970 because most of the damage is inflicted during winter months. Use of the machine will continue this fall with the advent of adequate soil moisture.

MINOR SPECIES. The preceding three species were the major source of the reforestation animal damage during the past fiscal year. The following species caused minor damage in the counties noted:

Species	Counties
1. Beaver	Inyo, Stanislaus
2. Black Bear	Del Norte, Humboldt
3. Elk	Humboldt
4. Mountain Beaver	Del Norte
5. Rabbits	Los Angeles, Lassen
6. Stock	Siskiyou, Lassen
7. Tree Squirrels	San Bernardino
8. Woodrat	San Bernardino, Del Norte

DIRECT SEEDING. Some 10,000 acres of direct seeding was done in Humboldt, Mendocino, Plumas and Shasta Counties by the Bureau of Land Management, Forest Service and private companies. Most of the seedings were reported as successful. In each case, endrin treated seeds were used as a repellent for deer mice, and some of the seedings (only a few acres) were preceded by 1080 baiting for seed-eating rodent control. The seeding in Mendocino County was preceded by an aerial baiting by the University of California at Davis with an anticoagulant, diphacinone, with good results. More work is scheduled with this compound during the coming season and, hopefully, it may find broader use.



Pocket gopher damage to ponderosa pine in the Lava Plantation, Modoc National Forest. (A) All planted trees in this picture have been killed. Only dead stubs remain. (B) This type of gopher damage occurs when the trees are covered by snow. Such damage is often mistaken for porcupine damage.

TABLE 1

INSECT CONTROL ACTION RECOMMENDED BY THE COUNCIL - 1969

NORTHERN CALIFORNIA COMMERCIAL AND RECREATIONAL FORESTS

INFESTATION AREA	ESTIMATED ACREAGE	COUNTY	INSECT	HOST	RECOMMENDED ACTION
BARK BEETLES					
Basket Pass	3,000	Kern	Db	PP	Log
Bass Lake	9,000	Madera	Db,Ips,Dm	PP,SP	Log, spray and research
Bradshaw	2,000	Kern	Db	PP	Log and spray
McCloud Flats	7,000	Siskiyou	Db	PP	Log and spray--research
South Shore Lake Tahoe	320	El Dorado	Sv,Dm,Mc	WF,LP,JP	Evaluate
DEFOLIATORS					
Callahan	600	Siskiyou	Ma	SP	Surveillance
Hat Creek and Latour State Forest	3,000	Shasta	Hp	WF	Surveillance
Sentinel, Crooked and Wet Meadows	2,200	Mono	Cm	LP	Surveillance and research
South Shore Lake Tahoe	1,280	El Dorado	Pp	JP,LP	Surveillance--research
PLANTATIONS AND EXPERIMENTAL AREAS					
Institute of Forest Genetics	2,000	El Dorado	Db,Ips	PP	Treat infested trees
Plantations	4,000	Siskiyou	Gh	PP,JP	Detection, eval. and control as needed
Seed Production Areas		Northern Calif.	C&S	PP	Surveillance--research
STATE AND NATIONAL PARKS					
Anza Borrego	500	San Diego	Db,Mc	CP	Maintenance control
Cuyamaca Rancho State Park	8,000	San Diego	Mc,Db	JP,PP	Maintenance control
Heart Bar	1,300	San Bernardino	Dj	JP	Maintenance control
Lassen Volcanic National Park	3,000	Shasta, Lassen	Dj,Db,Dm	JP,PP,SP,LP	Presuppression survey
Palomar State Park	1,500	San Diego	Db,Ips,Sv,Mc	CP,PP,WF	Surveillance
San Jacinto State Park	11,000	Riverside	Mc,Db	JP,CP,PP	Maintenance control
Sequoia and Kings Canyon	8,500	Fresno	Db,Dm	PP,SP	Limited maintenance control
Sequoia and Kings Canyon	400	Tulare	Cm	LP	Limited maintenance control
Yosemite National Park	57,700	Mariposa, Tuolumne	Db,Dm,Dj	PP,SP,JP,LP	Limited maintenance control
Yosemite National Park	9,000	Tuolumne	Cm	LP	Surveillance and research
SOUTHERN CALIFORNIA RECREATION FORESTS					
Arrowhead-Crestline	47,000	San Bernardino	Dm,Db,Ips,Dj	PP,CP,JP	San.-treatment and maintenance control
Arroyo-Seco District	3,000	Los Angeles	Db,Ips,Mc	PP,CP,JP	San.-treatment and maintenance control
Big Bear Valley	8,800	San Bernardino	Dj,Ips,Mc,Sv	JP,WF	Log and maint. control according to plan
Corte Madera	1,600	San Diego	Db,Ips,Mc,Dv	CP,JP,PP	Maint. control according to plan
Idyllwild-San Jacinto	37,000	Riverside	Mc,Db,Ips,Dm	PP,CP,JP	San.-treatment and maintenance control
Julian-Pine Hills	4,000	San Diego	Db,Ips	CP	Surveillance
Laguna Mtn.	9,700	San Diego	Db,Mc	CP,JP	Maint. control according to plan
Lost Valley	4,000	San Diego	Db,Ips	CP	Maint. control according to plan
Mt. Baldy District	1,500	Los Angeles	Ips,Dj,Dm,Mc,Db	PP,JP,CP	San.-treatment and maintenance control
Mt. Pinos-Cuyuma	22,000	Ventura	Ma	Pe	Surveillance--spray high use areas
Mt. Pinos District	7,900	Ventura, Kern	Mc,Ips	JP	San.-treatment and maintenance control
Palomar Mt.	6,600	San Diego	Db,Sv	CP,WF	Maintenance control
Ranger Peak-Figueroa Mt.	700	Santa Barbara	Db,Ips,Dv	PP,CP	Maintenance control according to plan
San Gorgonio District	25,000	San Bernardino	Db,Dj,Ips	PP,JP,CP	San.-treatment and maintenance control
Snow Valley	125	San Bernardino	C sp.	JP	Surveillance
Valyermo District	14,600	Los Angeles	Mc,Ips	JP,WF	San.-treatment and maintenance control
Wrightwood	2,000	San Bernardino	Mc,Ips	JP	Maintenance control

Abbreviations Used in Tables

INSECTS

C sp. - Jeffrey pine needle miner
Cm - Lodgepole needle miner
C&S - Cone and seed insects
Db - Western pine beetle
Dj - Jeffrey pine beetle
Dm - Mountain pine beetle
Gh - Grasshoppers
Hp - Douglas-fir tussock moth
Ips - Pine ips
Ma - Matsucoccus sp.
Mc - California flatheaded borer
Pp - White pine scale
Sv - Fir engraver

HOST

CP - Coulter pine
JP - Jeffrey pine
LP - Lodgepole pine
Pe - Pinyon pine
PP - Ponderosa pine
SP - Sugar pine
WF - White fir

A BRIEF OF RESOLUTIONS ADOPTED BY THE CALIFORNIA PEST CONTROL ACTION COUNCIL - 1969

At its annual meeting in November the Council took the following action:

1. Endorsed the insect control recommendations listed in Table 1.

2. Recognizing that oxident air pollution has been increasing throughout California from many sources; and because these air pollutants lead directly to severe damage and death of forest trees, recommended that the California State Legislature make control of air pollution a Number One concern during the 1970 session.

3. Urged for the fourth consecutive year that action be taken to immediately implement the Fish and Game Commissioner's deer management policy; and further, to revise the big game depredation laws to permit issuance of depredation permits for sufficiently long periods and sufficiently far in advance of actual damage to permit practical conduct of hunting programs.

4. Urged that additional funds be made available to research agencies for a much expanded program on the control of forest rodents by means of safer and more effective toxicants, the use of anti-fertility agents, and the development of seed repellents and bait attractants.